Lat 40.55278 Lon -123.16509

United States Department Of Agriculture
Forest Service
Shasta-Trinity National Forests
2400 Washington Avenue
Redding, CA 96001

Reply To: 3420

Date: May 30, 1989

Subject: Evaluation of Fire-damaged Sugar Pine, Hayfork RD (Rept. No. N89-11)

To: Forest Supervisor, Shasta-Trinity NFs

Marking crews on the Hayfork RD became concerned about the accuracy of guidelines to distinguish dying sugar pine in areas burned during the fires of 1987. Some of the sugar pine they examined had a band of dead cambium just above the soil line where the duff burned. The crews were concerned because the cambium was alive above and below the dead band, the foliage was green, and the trees appeared to have some signs of life such as breaking buds and resin flow from wounds. Timber Sale Preparation Forester Carl McMurtry requested input to the marking guidelines. On May 16, 1989, Dave Schultz and Gregg DeNitto from the Forest Pest Management Northern Service Area visited portions of the Sheep Camp Sale to examine the trees in question and assist in training the marking crew.

The only external sign of any damage on some of the sugar pine was a band of charred bark where the old duff layer had been. In most cases, the phloem and cambium were dead under the charred bark. The dead layer completely encircled some trees and they have survived for almost two years with no connection between the phloem in the above-ground portion of the tree and the phloem in the roots.

The fire was hot enough to kill a band of phloem and cambium in these trees, but not hot enough to disrupt the xylem tissues in the outer layers of the sapwood. The trees are able to take water and minerals up from the roots to the foliage through the intact xylem tissues. Photosynthesis takes place in the foliage and carbohydrates move back down the tree through the phloem to the point where it was killed by the fire. The portions of the tree above the dead band of phloem and cambium are still carrying on all, or most, of their life functions.

While the roots of these trees are currently alive, carbohydrates produced in the foliage can no longer move to the roots and they will eventually starve to death. As the roots grow weaker, they become less able to supply water and minerals to the above-ground portions of the tree, which makes the tree less able to resist attacks by bark beetles, engraver beetles, and flatheaded borers.

A few of the fire-girdled sugar pine examined were currently being attacked by the mountain pine beetle, Dendroctonus ponderosae, and will die this year. Depending upon a number of factors such as the weather, prior condition of the trees, and population levels of several species of beetles, the remaining trees which had their phloem severed by burning can be expected to die some time between 1989 and 1993.

Management Alternatives

1. Do not mark trees with any green foliage. There are numerous severely wounded trees remaining in the areas burned in 1987. Trees with injuries more severe than those indicated in the existing marking guidelines have a high probability of dying during the next few years. The mortality will not occur at one time but rather, will be spread over several years. Unless there are multiple entries, some of the mortality will be left standing. Multiple entries over a short period of time tend to be inefficient and increase the probability of damage to other resources.

2. Mark trees using existing damage guidelines. Use of the current guidelines based on the amount of crown and cambial damage will correctly identify a large percentage of the trees likely to die within the next few years. This would efficiently recover the volume that has a high probability of dying and minimize the disturbance caused by multiple entry.

Rapid removal of these trees will cause some opportunities to be forgone. It is possible that some of the trees would produce stress crops of cones and contribute to natural regeneration if left to die naturally. However, the probability that these trees would contribute much to regeneration is fairly low at this point. Sugar pines require two years to develop mature seed and some of these damaged trees may not live long enough to reproduce. The bare mineral soil seedbed which existed in some areas immediately after the fire has already begun to be covered by vegetation or organic material. Also, some severely injured stands still contain enough volume that much of the regeneration would be destroyed as the stand is either salvaged or breaks apart.

The other opportunity that might be forgone by accelerating salvage is that the severely injured trees can occupy the site and slow the development of brush and herbaceous vegetation. Some areas will be open enough after salvage activities that they will have to be quickly prepared and planted to recapture the sites.

If you need additional assistance, please call Dave Schultz or Gregg DeNitto at 916-246-5087.

David E. Schultz

David E. Schultz
Entomologist
FPM - Northern Service Area